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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/522,920	04/22/2005	Rainer Richter	016906-0365	4566
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EXAMINER				
ALL MOHAMMAD M				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/522,920

Applicant(s)

RICHTER ET AL.

Examiner

MOHAMMAD M. ALI

Art Unit

3744

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 March 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2 and 4-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-2 and 4-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SI.08)
- Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "the radius of curvature R1 which is greater than a rib height RH" for claim 1 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: The radius of curvature R1 which is greater than a rib height RH of the corrugated rib..

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. . Claims 1-2, 4-6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over G. E. Sugawara et al hereinafter Sugawara (U. S. Pat. No.5,560,425) in view of Yamaguchi et al (JP 2002-90083A)

In regard to claims 1 and 2, Figs. 1, 2, 3 and 5 of Sugawara discloses a heat exchanger, with a soldered/brazed/joined (see column 2, lines 66-67) heat exchanger network consisting of flat tubes/channels (12) and of corrugated ribs/fins (20), a liquid and/or gaseous medium being capable of flow through the flat tubes and air being capable of flow around the corrugated ribs, (see Fig.3-4 for air passage), a corrugated rib (11) having in each case two rib surfaces (with 11), see Fig. 3-4) which are arranged essentially parallel to one another (see Fig. 4), and which are connected in each case by means of an arcuate piece (with fin 20, see Fig. 3 and 4) soldered/brazed/joined to a

flat tube (5), a heat exchanger in that the rib surfaces are equipped with gills (see the air passage 16 in Figs 3 and 5). Sugawara discloses the invention substantially as claimed as stated above except parallel fins/ribs and the arcuate piece (with fin or rib 11) has a lower curvature (E) in a middle portion than in a first outer portion and in a second outer portion, (see Figs 3 and 4), (as per claim 1). Yamaguchi et al teach the use of parallel fins and arcuate piece. (See Fig. 3, part 15b (with fin or rib 12). The arcuate piece has a lower curvature in the middle portion than the first outer portion (see the curvature at the first corner, Fig. 3 for part 15b) and the second outer portion (see the curvature at the second corner, Fig. 3, part 15b) in heat exchanger for the purpose of efficiently exchanging heat. Yamaguchi et al also teach the use of gill louver 4 (See Fig. 5).

Therefore, it would have been obvious to an ordinary skilled in the art at the time the invention was made to modify the fin/rib of Flurschutz in view Yamaguchi et al such that a gill/louver and the above fin arcuate could be provided in order to improve the efficiency of heat exchange.

In regard to claims 4-6, Figs. 3-4 of Yamaguchi et al discloses a heat exchanger with fin/rib with the radius of curvature of the arcuate piece greater than the rib height, (as per claim 1), with the arcuate piece having in the first outer portion a radius of curvature which is lower than half a rib height of the corrugated rib (as per claim 4), the arcuate piece having in the second outer portion a radius of curvature which is greater than or equal to a radius of curvature in the first outer portion, (as per claim 5), the arcuate piece having in the second outer portion a radius of curvature which is lower than a rib height of the corrugated rib, (as per claim 6), (see Fig. 3, part 15b).

2. Claim 2, Yamaguchi et al disclose the gill/louver 4 (See Fig. 5)
3. Regarding claim 17, Yamaguchi et al disclose the fin 12 has flat portions on the sides and on the touching points of the flat tubes. See Fig 3, part 15b.
4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sugawara in view of Yamaguchi et al as applied to claim 1 above, in view of Kuroyanagi et al., (U. S. Pat. No. 6,308,527 B1).

It is noted that Sugawara and Yamaguchi et al do not specifically disclose the heat exchanger characterized in that the corrugated rib has a rib division in the range of 1 to 3 mm.

However, Fig. 6B of Kuroyanagi et al. teaches the corrugated rib has a rib division (fp), in the range of 1 to 3 mm, (see col. 8., ln. 18.) Hence, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine the apparatus of Sugawara and Yamaguchi et al with the rib division of Kuroyanagi et al resulting in a heat exchanger that would improve the heat transmission on the air side.

5. Claims 1-2, 4-6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over G. E. Flurschutz hereinafter Flurschutz (U. S. Pat. No. 2,731,243.) in view of Yamaguchi et al (JP 2002-90083 A)

In regard to claims 1 and 2, Figs. 1, 2, 3 and 5 of Flurschutz discloses a heat exchanger, with a soldered/brazed/joined heat exchanger network consisting of flat tubes/channels (20/22) and of corrugated ribs/fins (17), a liquid and/or gaseous medium

being capable of flow through the flat tubes and air being capable of flow around the corrugated ribs, (see Fig.2 for air passage), a corrugated rib (17) having in each case two rib surfaces (17, see Fig. 3, 5) which are arranged essentially parallel to one another (see Fig. 5), and which are connected in each case by means of an arcuate piece (14, see Fig. 3 and 5) soldered/brazed/joined to a flat tube (20), (as per claim 1); a heat exchanger in that the rib surfaces are equipped with gills (see the air passage 16 in Figs 3 and 5), (as per claim 2). Flurschutz disclose the invention substantially as claimed as stated above except the arcuate piece (14) has a lower curvature in a middle portion than in a first outer portion and in a second outer portion. Yamaguchi et al teach the use of the arcuate piece has a lower curvature in the middle portion (the mid between two outer corners, See Fig. 3, part 15b) than the first outer portion (at first corner, at the corner portion, there being a curved portion) and the second outer portion in a heat exchanger for the purpose of efficiently exchanging heat. Yamaguchi et al also disclose a gill/louver 4 (See Fig. 5). Therefore, it would have been obvious to an individual skilled in the art at the time the invention was made to modify the fin of Flurschutz in view of Yamaguchi et al such at a gill/louver and the fin with above disclosed arcuate in order to improve the heat exchange efficiency.

In regard to claims 4-6, Figs. 8 of Yamaguchi et al disclose a heat exchanger with the radius of curvature of the arcuate piece greater than the rib height, with the arcuate piece having in the first outer portion a radius of curvature which is lower than half a rib height of the corrugated rib (as per claim 4), the arcuate piece having in the

second outer portion a radius of curvature which is greater than or equal to a radius of curvature in the first outer portion, (as per claim 5), the arcuate piece having in the second outer portion a radius of curvature which is lower than a rib height of the corrugated rib, (as per claim 6), (see col. 4, ln. 26-29).

6. Regarding claim 2, Yamaguchi et al disclose the gill/louver 4 (See Fig.5).
7. Regarding claim 17, Yamaguchi et al disclose that the fin/rib has flat portion. See Fig. 3, part 15b.
8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Flurschutz in view of Yamaguchi et al as applied to claim 1 above and further in view of Kuroyanagi et al(U. S. Pat. No. 6,308,527 B1).

It is noted that Flurschutz and Yamaguchi et al do not specifically disclose the heat exchanger characterized in that the corrugated rib has a rib division in the range of 1 to 3 mm.

However, Fig. 6B of Kuroyanagi et al. teaches the corrugated rib has a rib division (fp), in the range of 1 to 3 mm, (see col. 8., ln. 18.) Hence, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine the apparatus of Flurschutz and Yamaguchi et al with the rib division of Kuroyanagi et al. resulting in a heat exchanger that would improve the heat transmission on the air side.

9. Claims 9 , 11, 12-15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Flurschutz in view of Yamaguchi et al as applied to claim 1 above and further in view of Shimoya et al. (U. S. Pat. No. 7,231,965 B2).

In regard to claim 9, it is noted that Flurschutz does not specifically disclose the heat exchanger characterized in that the corrugated rib has a rib depth in, the range of 10 to 70 mm.

However, Fig. 16 of Shimoya et al. teaches the corrugated rib has a rib depth (B, and see col. 5, ln. 57-59) in the range of 10 to 70 mm. Hence, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine the apparatus of Flurschutz with the rib depth of Shimoya et al. resulting in a heat exchanger that would improve the heat transmission on the air side.

In regard to claim 11, it is noted that Flurschutz and Yamaguchi et al do not specifically disclose the heat exchanger characterized in that corrugated rib has a rib height in a range of 3 to 15 mm.

However, Fig. 19 of Shimoya et al. teaches the corrugated rib has a rib height (C) in a range of 3 to 15 mm. (see col. 15, ln 65-67, and col. 16, ln. 1-3, and 21-32). Hence, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine the apparatus of Flurschutz and Yamaguchi et al with the rib height of Shimoya et al. resulting in a heat exchanger that would improve the heat transmission on the air side.

Regarding claims 13-15, Shimoya et al disclose the rib depth of 10 to 70 mm which meets the limitations of claims 13-15 too.

Regarding claim 16, the heat exchanger of Flurschutz is capable of being used in motor vehicle as a refrigerant condenser.

10. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Flurschutz in and of Yamaguchi et al as applied to claim 2 above and further in view of Hu et al., (U. S. Pat. No. 6,805,193 B2).

It is noted that Flurschutz and Yamaguchi et al do not specifically disclose the heat exchanger characterized in that the gills have a gill depth in a range of 0.5 to 1.5 mm and a gill angle in the range of 20 degree to 35 degree.

Fig. 7 of Hu et al discloses a gill angle in the range of 20 degree to 35 degree (see col. 2, ln. 54-58). Hence, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine the apparatus of Flurschutz and Yamaguchi et al with the gill depth of Shimoya et al. and the gill angle of Hu et al. resulting in a heat exchanger that would improve the heat transmission on the air side.

11. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Flurschutz, Yamaguchi et al and Kuroyanagi et al in view of Shimoya et al.

It is noted that Flurschutz does not specifically disclose the heat exchanger characterized in that the ratio of gill depth LP to rib division FP is in a range of 0.385 to 0.825. It is also noted that not all of the ranges of LP and FP of the invention fall into a ratio range of 0.385 to 0.825.

However, Fig. 6B of Kuroyanagi et al. teaches a rib division of 2.6 mm, and Fig. 7 of Shimoya et al. teaches a gill depth of 0.75 mm resulting in a gill depth to rib division ratio of 0.288. Since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Flurschutz in view of Yamaguchi et al as applied to claim 1 and further in view of Kreutzer et al (US 5,361,829 A). Flurschutz and Yamaguchi et al disclose the invention substantially as claimed as stated above except soldering of rib. Kreutzer et al teach the use of soldering the rounded rib portion 4 with flat tubes 2 in a heat exchanger for the purpose of efficient heat transfer. See column 2, lines 40-41. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the heat exchanger of Flurschutz and Yamaguchi et al in view of Kreutzer et al such that ribs could be soldered with the flat channels in order to exchange heat in efficient manner..

Response to Arguments

Applicant's arguments with respect to claim 1-2, 4-17 have been considered and the rejections have been withdrawn but are moot in view of the new ground(s) of rejection as explained above in the new rejections with new prior art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MOHAMMAD M. ALI whose telephone number is (571)272-4806. The examiner can normally be reached on Monday through Thursday from 8.30 am to 12 Noon and from 1 pm to 5.30 pm and on Friday from 6 am to 11.30 am and from 2.30 pm to 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl J. Tyler can be reached on 571-272-4808. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mohammad M Ali/

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Primary Examiner, Art Unit 3744